

Exposure Investigation at Continental Aluminum

**Conducted by the Michigan Department of Community Health
for the Agency for Toxic Substances and Disease Registry,
March 1 – May 31, 2004, Lyon Township, Oakland County**

Outline of presentation:

- Purpose of EI, protocol development
- Results for metals (dusts and mercury)
- Results for acids and VOCs
- What about past exposure and soils?
- Conclusions
- 10-minute break
- Blood aluminum levels
- Questions/comments on report itself

Purpose of Investigation

- **Public health hazard of emissions from Continental Aluminum could not be determined from available information.**
- **EI would measure air concentrations of chemicals expected to be emitted by a secondary aluminum smelter and during odor events.**
- **EI would also collect local meteorological data.**
- **MDCH compared concentrations found to health-based Comparison Values.**

Development of EI Protocol

- **Determine appropriate chemicals to test for**
- **Determine appropriate testing methods**
- **Contract with analytical laboratories and electric utility**
- **Make arrangements with other agencies (ATSDR, MDEQ, Oakland Health) for assistance**
- **Work with local groups**
 - **School board, Dolsen administrators**
 - **Citizens Advisory Workgroup**
 - **Sampling personnel**

Expected emissions:

- **Metals (as airborne particulates)**
- **Mercury (as vapor)**
- **Acidic aerosols (HCl, HF)**
- **Volatile organic compounds (can cause odors)**

Air monitoring trailers at Dolsen Elementary School

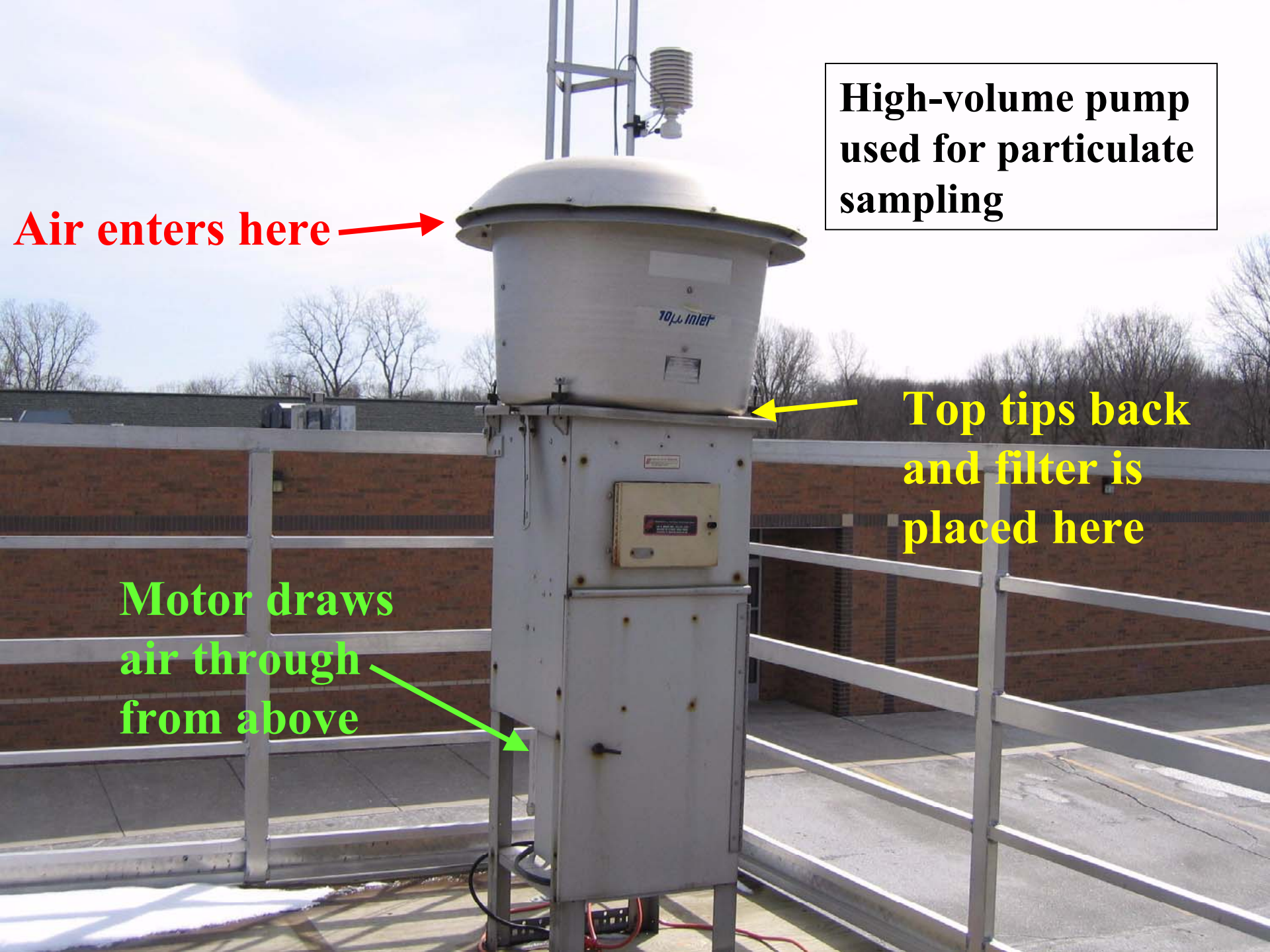


**High-volume pump
used for particulate
sampling**

Air enters here →

**Top tips back
and filter is
placed here**

**Motor draws
air through
from above** →



Timer set
for 24-hr
period



Dixon chart
(inside) records
steadiness of air
flow

Magnehelic
gauge readings
(before and
after sampling)
help determine
total air flow



Metals

- Tested for aluminum, barium, beryllium, cadmium, chromium, copper, lead, manganese, selenium, and zinc.
- Ten 24-hour filter samples taken, two **blanks** also analyzed
- Test measures total metal, regardless of form it's in

Metals (cont'd)

- Chemicals generally not detected: beryllium, cadmium, selenium
- Chemicals detected with some uncertainty: chromium, lead
- Chemicals detected with certainty: aluminum, barium, copper, manganese, zinc

Metals (cont'd)

- Most concentrations fell well below the lowest Comparison Value
 - Highest reading for aluminum was more than 25,000X below its Comparison Value
- Highest chromium reading was close to its Comparison Value but was likely even lower
- Highest manganese reading was about 2-1/2X less than its Comparison Value

Metals - Conclusion:

- **Exposure is occurring (metals are present)**
- **Source cannot be determined (may be multiple sources, including naturally occurring)**
- **Concentrations do not exceed Comparison Values**
- **No adverse health effects are expected**



**Air intake for
monitors inside
trailer**

Mercury

- **Monitored continuously, reporting a 5-minute average**
- **Test measures elemental mercury vapor**
- **Average concentration well below Comparison Values**
- **Some spikes, but still less than short-term Comparison Values**

Mercury – Conclusion:

- **Exposure is occurring but no adverse health effects are expected**
- **Has been referred to MDEQ (local average concentration was greater than background concentrations seen elsewhere in Michigan, indicating a source); MDEQ is planning more studies in 2005**
- **Source cannot be determined from EI data**

**ChemCassette
(treated paper tape)**

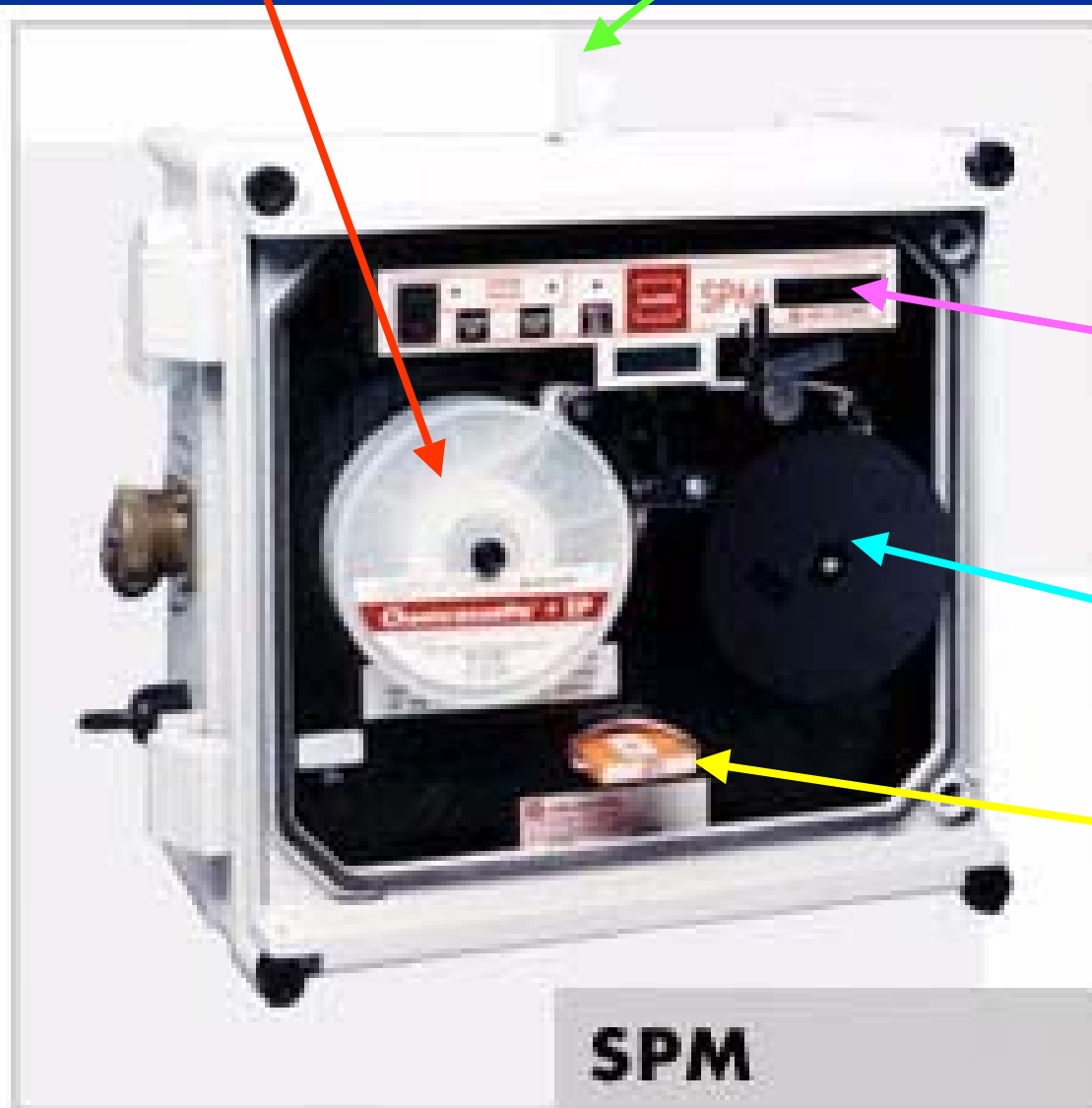
Acid Monitor

Air inlet

**Real-time
readout**

**Take-up
spool**

“key”



Acidic Aerosols

- **Monitored continuously**
- **More qualitative (was it there) rather than quantitative (how much was there) test**
- **Cannot verify if acid was HCl; it was likely not HF**
- **No odors reported during time periods when acids detected**

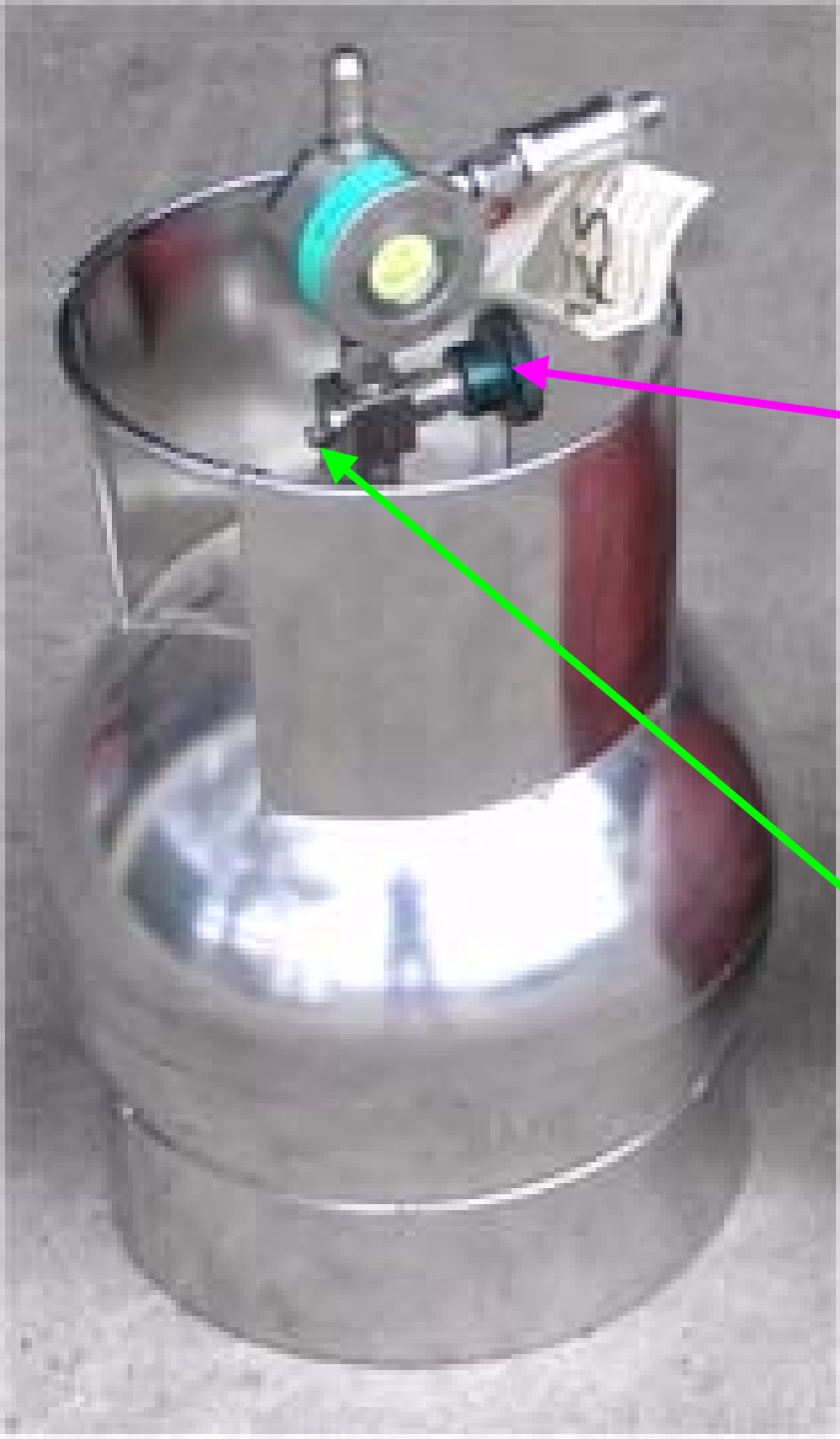
Acidic Aerosols – Conclusion:

- Exposure is occurring but sporadically
- If the detected acid was HCl, the highest concentration detected was still less than the lowest short-term Comparison Value and no adverse health effects would be expected
- Source cannot be determined from EI data

Summa canister

Open valve here

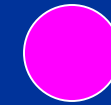
Air enters canister here



VOC Sampling Locations



Control Samples



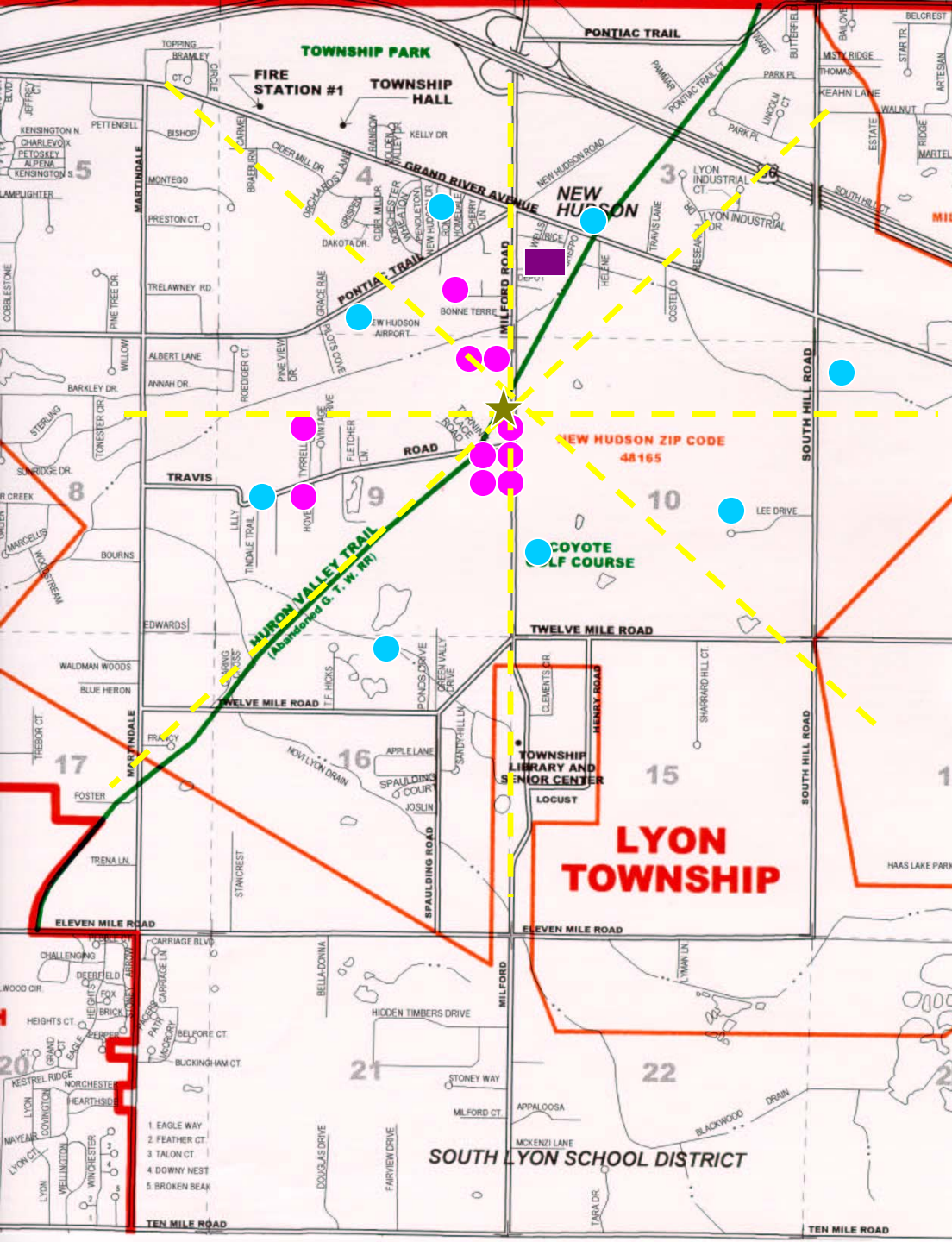
Odor Samples



Continental Aluminum



Monitoring trailer at Dolsen



VOCs

- **Instantaneous (“grab”) sample taken by local responder during odor event**
- **Each sample paired with a corresponding “control” sample**
- **Four field blanks (unopened) also analyzed**

VOCs (cont'd)

- **Field blanks had some detections (expected)**
- **Control concentrations were sometimes higher than odor-event concentrations**
- **Generally, all concentrations were well below lowest Comparison Values**
 - **Benzene was about $\frac{1}{2}$ its Comparison Value**
 - **1,3-Butadiene was about $\frac{1}{6}$ its Comparison Value**

VOCs – Conclusion:

- **Exposure is occurring (VOCs are common chemicals)**
- **No adverse health effects are expected**
- **Source cannot be determined from EI data**

Past exposure?

- No models exist for back-calculating an air concentration from soil data
- Any attempt to estimate historic air concentrations would be rife in uncertainty
- Past public health hazard cannot be determined

Exposure to soil?

- **2001 soil data from two residences downwind of Continental Aluminum**
 - Measured many of the metals included in the EI
 - Most concentrations were below expected background
 - All concentrations well below Comparison Values for soil (addressing skin contact and accidental ingestion)
- **Not expected to cause adverse health effects**

No Apparent Public Health Hazard

- **Category used for sites where human exposure to contaminated media may be occurring, may have occurred in the past, and/or may occur in the future, but the exposure is not expected to cause any adverse health effects.**
- **Based on critical data that ATSDR considers sufficient to support a decision. Does not necessarily imply that the available data are complete, just that they are sufficient.**

Blood Aluminum Levels

- **MDCH was contacted by a parent who had chosen to have her children's blood tested for aluminum levels and by the clinic that tested the children**
- **The lab that did the analysis reported aluminum levels greater than the lab's reference range**
- **What does this mean?**

MDCH conferred with:

- **The lead author of the Toxicological Profile for Aluminum (ATSDR Division of Toxicology)**
- **ATSDR Regional Office (Chicago)**
- **Pediatric Environmental Health Specialty Unit (Chicago's Cook County Hospital)**
- **Michigan Poison Control Center (Detroit Medical Center)**

Aluminum Sources

- **3rd most common element (most common metal) in earth's crust**
- **Found in processed foods, acidic foods cooked in aluminum pans, drinking water, hygiene and medical products, dust (from soil or smelting emissions)**
- **Exposure is inevitable due to abundance and use**

What follows exposure?

- **Most ingested aluminum passes right through the body, excreted in the feces**
- **Remainder absorbed, then excreted by kidneys (some fruit juices enhance absorption)**
- **Some inhaled aluminum may be retained by lung, absorbed into body, then excreted by kidneys**

Should I get tested?

- Unless you have a kidney disorder that requires dialysis, testing is not recommended
- People with kidney disorders are unable to excrete compounds efficiently and are susceptible to toxic effects of many chemicals

If you get tested anyway:

- **Blood tests are preferred over urine tests**
- **Do not use hair testing**
- **Know potential exposures ahead of time (food, water, medicines, etc.) and eliminate or minimize them**
- **Understand what “reference range” can mean (next slide)**

Reference Range \neq Normal Range

No “normal range” has been
established for aluminum in blood.

If results are higher than the reference range:

- **Evaluate all recent potential exposures with your doctor**
- **Re-test to verify results after doctor reviews test method**
- **If necessary, assess kidney function**

Bottom Line:

The environmental data do not indicate excess aluminum (or any other tested chemicals) in the area.

If your kidneys are in good health, aluminum exposure (through everyday activities or through exposure to emissions from Continental Aluminum) should not negatively affect your health.